Artificial Intelligence Overview

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Artificial Intelligence Overview

1. **What is Artificial Intelligence ?**

2. **Major Artificial Intelligence Techniques**
   - Rules and Logic Based Approach
   - Machine Learning Based Approach
   - Hybrid System

3. **Limits of Artificial Intelligence Today**

What is Artificial Intelligence?

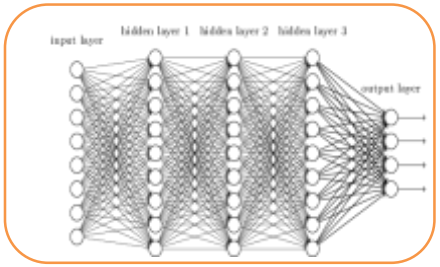
Artificial Intelligence (AI)

- **What is Artificial Intelligence (AI)?**
  - Using computers to solve problems
  - Or make automated decisions
  - For tasks that, when done by humans,
  - Typically require intelligence

Limits of Artificial Intelligence

- **"Strong" Artificial Intelligence** ✗
  - Computers thinking at a level that meets or surpasses people
  - Computers engaging in abstract reasoning & thinking
  - ***This is not what we have today***
    - ***There is no evidence that we are close to Strong AI***

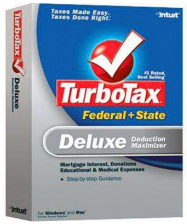
- **"Weak" Pattern-Based Artificial Intelligence** ✓
  - Computers solve problems by detecting useful patterns
  - Pattern-based AI is an **Extremely** powerful tool
  - Has been used to automate many processes today
    - Driving, language translation
  - This is the dominant mode of AI today



Major AI Approaches

Two Major AI Techniques

- **Logic and Rules-Based Approach**



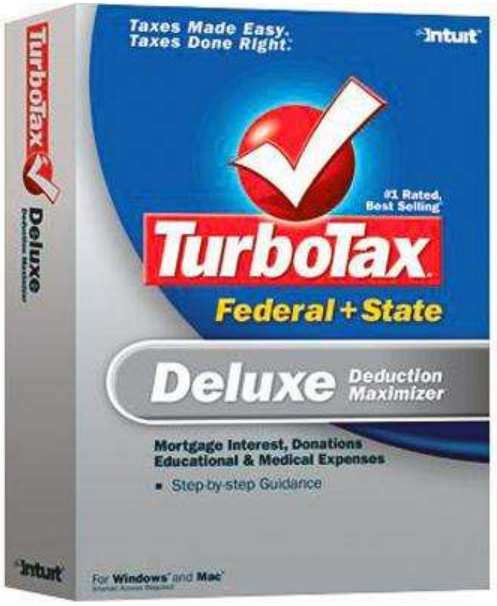
- **Machine Learning (Pattern-Based Approach)**

Logic and Rules-Based AI

Logic and Rules-Based Approach

- **Logic and Rules-Based Approach**
  - Representing processes or systems using logical rules
  - Top-down rules are created for computer
  - Computers reason about those rules
  - Can be used to automate processes

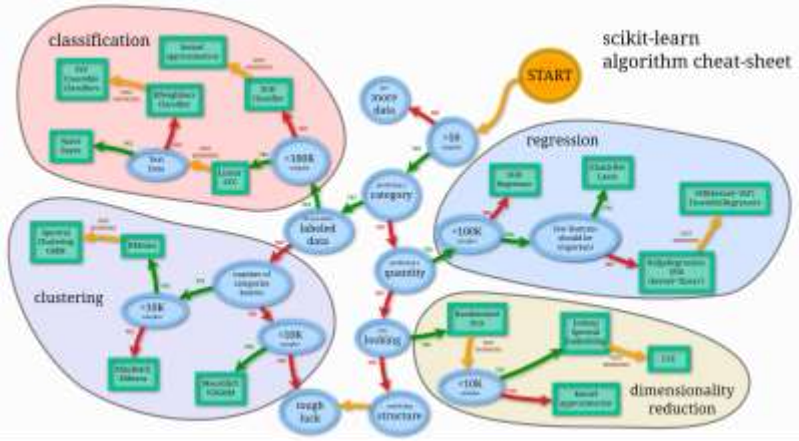
- Example within law – Expert Systems
  - Turbotax
    - Personal income tax laws
    - Represented as logical computer rules
    - Software computes tax liability



Machine Learning

Machine Learning (Pattern based)

- **Machine Learning (ML)**
  - Algorithms find patterns in data and infer rules on their own
    - ”Learn” from data and improve over time
  - These patterns can be used for automation or prediction
  - ML is the **dominant** mode of AI today



Machine Learning Uses

Self-Driving Vehicles

NETFLIX

Automated recommendations

Google Translate

Computer Translation

Machine Learning Main Points

- Learning
- Pattern Detection
- Data
- Self-Programming

Example: Email Spam Filter

“Earn Cash”
detected
in **10% of Spam** emails
0% of wanted emails

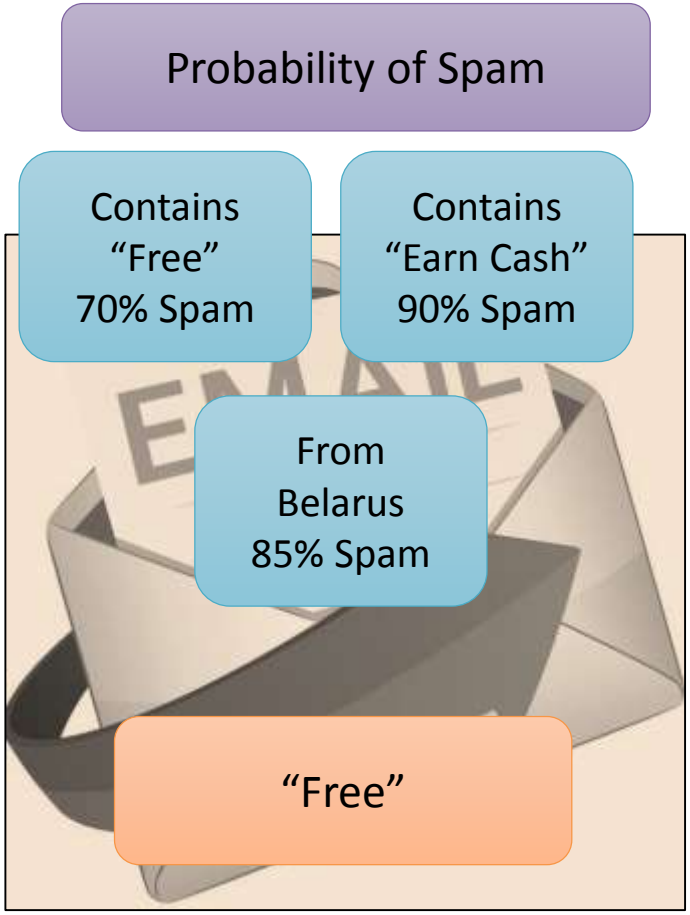
Spam or Wanted Email?

System detects patterns in Email
About likely markers of spam

<u>Detected Pattern</u>
Emails with ***“Earn Cash”***
More likely to be spam email

Can use such detected patterns to make automated decisions about future emails

Example: Email Spam Filter



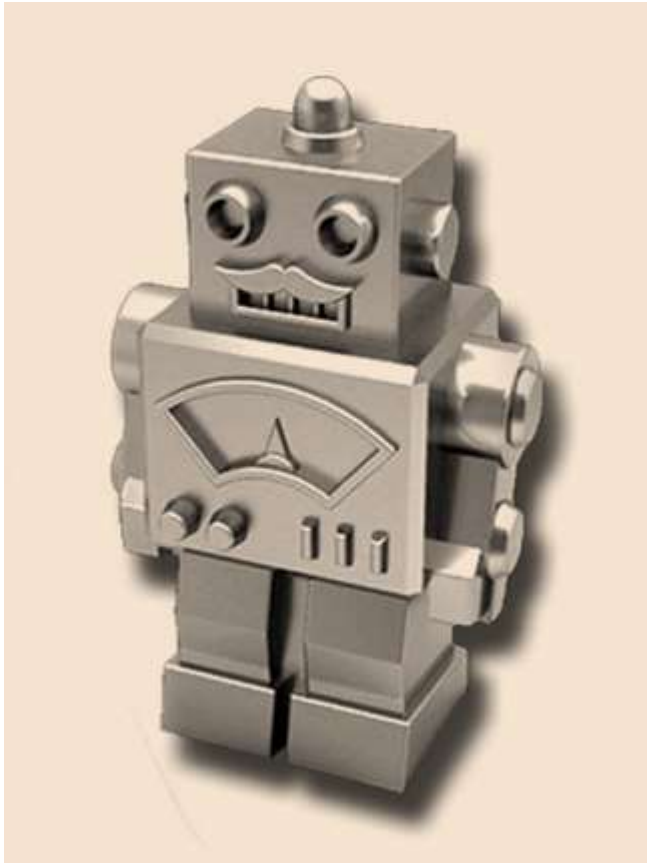
Identification Improves

Algorithm improves in performance
In auto-identifying spam

As it is able to examine more data
And find additional indicia of spam

Algorithm is "learning" over time
from additional examples

Intelligent Results Without Intelligence



For *some (not all)* complex tasks Requiring intelligence

Can get “intelligent” automated results *without intelligence*

By finding suitable *Proxies or Patterns*

Proxies for Intelligent Results Without Intelligence

Statistical Machine Translation

People use advanced cognitive skills to translate

Google finds statistical correlations by analyzing previously translated documents

Produces automated translations using statistical likelihood as a “proxy” for underlying meaning

Proxy Principle for Automation

Detecting
Patterns

That can serve as
Proxies

For some underlying
Cognitive Task

Machine Learning Main Points

- Learning
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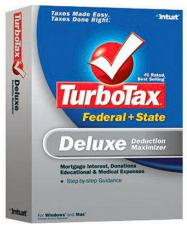
- Self-Programming

Summary Major AI Approaches

Two Major AI Techniques

- **Logic and Rules-Based Approach**



- **Machine Learning (Pattern-Based Approach)**

Hybrid Systems

- Many successful AI systems are hybrids of
  - Machine learning & Rules-Based Hybrids
    - e.g. Self-driving cars employ both approaches
  - Human intelligence + AI Hybrids
    - Also, many successful AI systems work best when
    - They *work with* human intelligence
    - AI systems supply information for humans

Technology Enhancing (Not Replacing) Humans

Humans

+

Computers

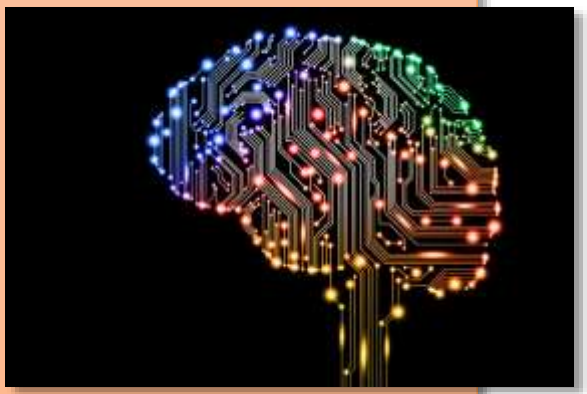
>

Humans Alone

Computers Alone

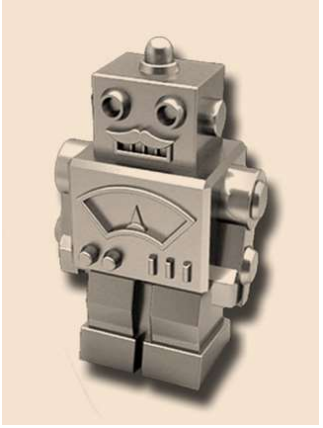
Examples of AI in Law Today

- **Machine Learning**
  - AI in Litigation - E-Discovery and ”Predictive Coding”
  - Natural Language Processing (NLP) of Legal Documents
    - Automated contract analysis
  - Predictive Analytics for Litigation
  - Machine Learning Assisted Legal Research
- **Logic and Rules-Based Approaches**
  - Compliance Engines
  - Expert Systems
  - Attorney Workflow Rule Systems
  - Automated Document Assembly



Limits on Artificial Intelligence

- **Artificial Intelligence Accomplishments**
  - Automate many things that couldn't do before
- **Limits**
  - Many things still beyond the realm of AI
  - No thinking computers
  - No Abstract Reasoning
  - Often AI systems Have Accuracy Limits
  - Many things difficult to capture in data
  - Sometimes Hard to interpret Systems



Questions

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